

Serial No.: 10/541,744
Examiner: W. Choi
Title: SMALL ZOOM LENS, AND DIGITAL CAMERA AND VIDEO CAMERA BOTH HAVING SAME
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Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

1. (previously presented) A small zoom lens comprising:

a first lens group that comprises a lens having a negative refractive power, a lens having a positive refractive power and a lens having a positive refractive power, arranged in that order from an object side, that has a positive refractive power as a whole, and that is fixed with respect to an image plane;

a second lens group that has a negative refractive power as a whole, and that causes a zooming action when moved along an optical axis;

an aperture stop that is fixed with respect to the image plane;

a third lens group that comprises at least one aspherical surface, that comprises a meniscus negative lens whose concave surface faces the object side and a lens having a positive refractive power, arranged in that order from the object side, that has a positive or negative refractive power as a whole, and that is fixed with respect to a direction of the optical axis when zooming and when focusing; and

a fourth lens group that comprises a lens having a positive refractive power, a lens having a negative refractive power and a lens having a positive refractive power, arranged in that order from the object side, that has a positive refractive power as a whole, and that moves along the optical axis such that the image plane, which is displaced by a movement of the second lens group along the optical axis and by a movement of the object, is maintained at a constant position with respect to a reference plane,

wherein the following Condition (1) is satisfied:

(1) $4.01 < |f_3/f_4| < 60$, where

f_3 : focal length of the third lens group,

f_4 : focal length of the fourth lens group.

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2. (original) The small zoom lens according to claim 1,
wherein the second lens group comprises at least one aspherical surface, and
comprises a meniscus negative lens whose convex surface faces the object side, a lens
having a negative refractive power and a lens having a positive refractive power,
arranged in that order from the object side.

3. (cancelled)

4. (cancelled)

5. (original) The small zoom lens according to claim 1,
wherein the third lens group satisfies the following Condition (2):

(2) $14 < |f_3/f_w| < 210$, where

f_3 : focal length of the third lens group,

f_w : focal length of the entire system at the wide-angle end.

6. (original) The small zoom lens according to claim 1,
wherein the third lens group satisfies the following Condition (3):

(3) $3 < |f_3/BF_w| < 55$, where

f_3 : focal length of the third lens group,

BF_w : back focus at the wide-angle end.

7. (original) The small zoom lens according to claim 1,
wherein the third lens group satisfies the following Condition (4):

(4) $0.85 < |f_{31}/f_{32}| < 1.5$, where

f_{31} : focal length of the first lens from the object side of the third lens group,

f_{32} : focal length of the second lens from the object side of the third lens group.

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8. (original) The small zoom lens according to claim 1,

wherein the third lens group satisfies the following Conditions (5) and (6):

(5) $|nd31 - nd32| < 0.15$

(6) $|vd31 - vd32| < 3.0$, where

nd31: refractive index of the lens of the third lens group that is on the object side,

nd32: refractive index of the lens of the third lens group that is on the image side,

vd31: Abbe number of the lens of the third lens group that is on the object side,

vd32: Abbe number of the lens of the third lens group that is on the image side.

9. (previously presented) The small zoom lens according to claim 1,

wherein the fourth lens group comprises at least one aspherical surface and a pair of cemented lenses.

10. (original) The small zoom lens according to claim 1,

wherein when a refractive power of the surface of the fourth lens group that is closest to the object side is $\phi 41$ and the maximum image height is RIH, the following Condition (7) is satisfied:

(7) $0.005 < \phi 41/RIH < 0.035$.

11. (original) The small zoom lens according to claim 1,

wherein a single lens is disposed closest to the object side in the fourth lens group, and when a refractive power of the surface of the single lens that is on the object side is $\phi 41$ and a refractive power of the surface of the single lens that is on the image side is $\phi 42$, the following Condition (8) is satisfied:

(8) $0.04 < (\phi 41 - \phi 42)/RIH < 0.06$.

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12. (original) The small zoom lens according to claim 1,

wherein the fourth lens group comprises a cemented lens constituted by a lens having a positive refractive power and a lens having a negative refractive power, and a single lens having a positive refractive power, arranged in that order from the object side, and when a refractive power of the surface of the cemented lens that is closest to the object side is $\phi 41$ and a refractive power of the surface of the cemented lens that is closest to the image side is $\phi 43$, the following Condition (9) is satisfied:

$$(9) \quad 0.025 < (\phi 41 - \phi 43)/RIH < 0.045.$$

13. (original) A digital camera using the small zoom lens according to claim 1.

14. (original) A video camera using the small zoom lens according to claim 1.

15. (new) A camera comprising the small zoom lens according to claim 1 and an element that outputs a signal of an image formed by the small zoom lens.